Appendix

Isabel Renteria and Zuzu Trottier

cor(pre\_covid\_num)

## Student\_Attendance\_Year\_2\_Pct  
## Student\_Attendance\_Year\_2\_Pct 1.00000000  
## Teacher\_Attendance\_Year\_2\_Pct 0.09082425  
## Suspensions\_Per\_100\_Students\_Year\_2\_Pct -0.61486384  
## Misconducts\_To\_Suspensions\_Year\_2\_Pct -0.14451478  
## Teacher\_Attendance\_Year\_2\_Pct  
## Student\_Attendance\_Year\_2\_Pct 0.09082425  
## Teacher\_Attendance\_Year\_2\_Pct 1.00000000  
## Suspensions\_Per\_100\_Students\_Year\_2\_Pct -0.06036052  
## Misconducts\_To\_Suspensions\_Year\_2\_Pct -0.03518840  
## Suspensions\_Per\_100\_Students\_Year\_2\_Pct  
## Student\_Attendance\_Year\_2\_Pct -0.61486384  
## Teacher\_Attendance\_Year\_2\_Pct -0.06036052  
## Suspensions\_Per\_100\_Students\_Year\_2\_Pct 1.00000000  
## Misconducts\_To\_Suspensions\_Year\_2\_Pct 0.20391880  
## Misconducts\_To\_Suspensions\_Year\_2\_Pct  
## Student\_Attendance\_Year\_2\_Pct -0.1445148  
## Teacher\_Attendance\_Year\_2\_Pct -0.0351884  
## Suspensions\_Per\_100\_Students\_Year\_2\_Pct 0.2039188  
## Misconducts\_To\_Suspensions\_Year\_2\_Pct 1.0000000

cor(post\_covid\_num)

## Student\_Attendance\_Year\_2\_Pct  
## Student\_Attendance\_Year\_2\_Pct 1.00000000  
## Teacher\_Attendance\_Year\_2\_Pct 0.28228203  
## Suspensions\_Per\_100\_Students\_Year\_2\_Pct -0.64916121  
## Misconducts\_To\_Suspensions\_Year\_2\_Pct -0.09092687  
## Teacher\_Attendance\_Year\_2\_Pct  
## Student\_Attendance\_Year\_2\_Pct 0.28228203  
## Teacher\_Attendance\_Year\_2\_Pct 1.00000000  
## Suspensions\_Per\_100\_Students\_Year\_2\_Pct -0.07068021  
## Misconducts\_To\_Suspensions\_Year\_2\_Pct -0.11753033  
## Suspensions\_Per\_100\_Students\_Year\_2\_Pct  
## Student\_Attendance\_Year\_2\_Pct -0.64916121  
## Teacher\_Attendance\_Year\_2\_Pct -0.07068021  
## Suspensions\_Per\_100\_Students\_Year\_2\_Pct 1.00000000  
## Misconducts\_To\_Suspensions\_Year\_2\_Pct 0.13797463  
## Misconducts\_To\_Suspensions\_Year\_2\_Pct  
## Student\_Attendance\_Year\_2\_Pct -0.09092687  
## Teacher\_Attendance\_Year\_2\_Pct -0.11753033  
## Suspensions\_Per\_100\_Students\_Year\_2\_Pct 0.13797463  
## Misconducts\_To\_Suspensions\_Year\_2\_Pct 1.00000000

# generally independent, with some higher correlation values for (suspensions and   
# student attendance) and (suspensions and misconduct-to-suspensions)

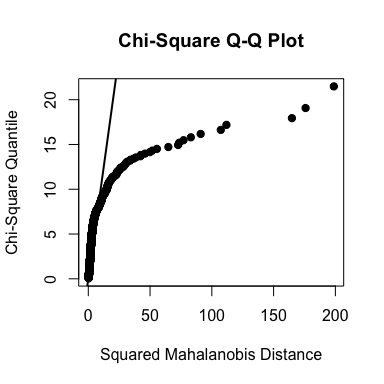


Figure 1: Multivariate QQ plot for pre covid data

# MVN  
mvn\_pre$multivariateNormality

## Test HZ p value MVN  
## 1 Henze-Zirkler 90.40323 0 NO

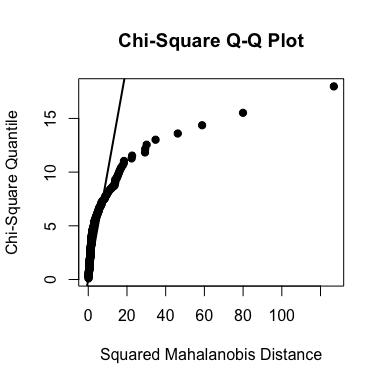


Figure 2: Multivariate QQ plot for post covid data

# MVN  
mvn\_post$multivariateNormality

## Test HZ p value MVN  
## 1 Henze-Zirkler 21.63475 0 NO

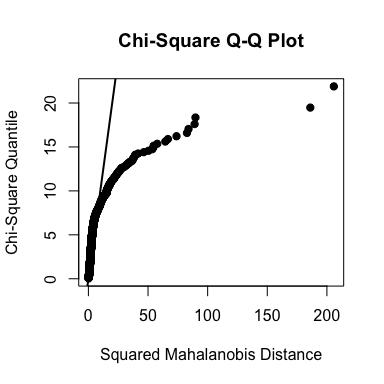


Figure 3: Multivariate QQ plot for all data

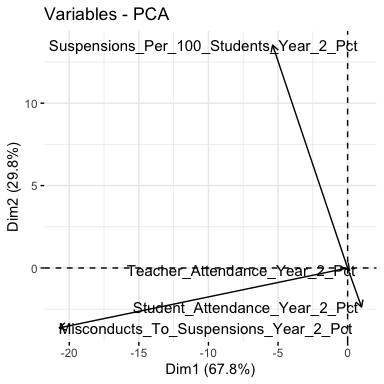


Figure 4: Biplot of variables for pre covid data’s PCA

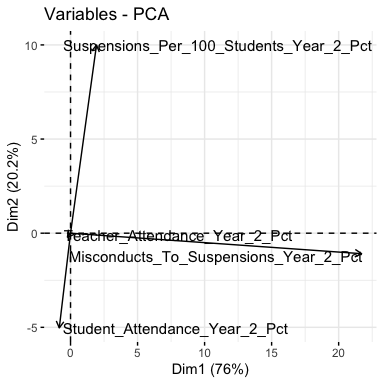


Figure 5: Biplot of variables for post covid data’s PCA

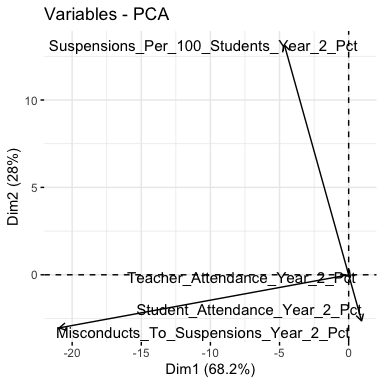


Figure 6: Biplot of variables for all data’s PCA

# PC selection  
PCA\_pre <- prcomp(pre\_covid\_num, scale = sapply(pre\_covid\_num,sd))  
summary(PCA\_pre)

## Importance of components:  
## PC1 PC2 PC3 PC4  
## Standard deviation 1.3111 0.9917 0.9572 0.6174  
## Proportion of Variance 0.4298 0.2459 0.2291 0.0953  
## Cumulative Proportion 0.4298 0.6756 0.9047 1.0000

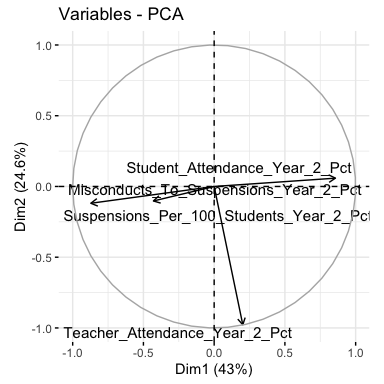


Figure 7: Biplot of variables for pre covid data’s PCA when scaled by standard deviation

# PC selection  
PCA\_post <- prcomp(post\_covid\_num, scale = sapply(post\_covid\_num,sd))  
summary(PCA\_post)

## Importance of components:  
## PC1 PC2 PC3 PC4  
## Standard deviation 1.3350 0.9995 0.9524 0.5582  
## Proportion of Variance 0.4456 0.2498 0.2268 0.0779  
## Cumulative Proportion 0.4456 0.6953 0.9221 1.0000

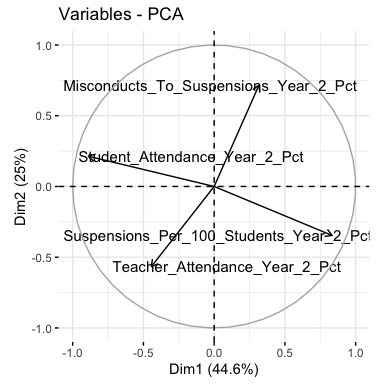


Figure 8: Biplot of variables for post covid data’s PCA when scaled by standard deviation

# PC selection  
PCA\_all <- prcomp(all\_data, scale = sapply(all\_data,sd))  
summary(PCA\_all)

## Importance of components:  
## PC1 PC2 PC3 PC4  
## Standard deviation 1.2642 0.9890 0.9604 0.7081  
## Proportion of Variance 0.3995 0.2445 0.2306 0.1253  
## Cumulative Proportion 0.3995 0.6441 0.8747 1.0000

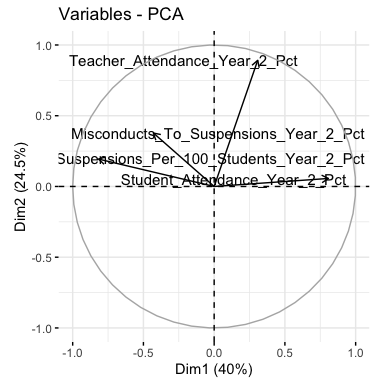


Figure 9: Biplot of variables for all data’s PCA when scaled by standard deviation

# MANOVA with Wilks-Lambda test for pre covid data  
mano\_pre\_PC <- manova( cbind(Suspensions\_Per\_100\_Students\_Year\_2\_Pct,  
 Misconducts\_To\_Suspensions\_Year\_2\_Pct,  
 Teacher\_Attendance\_Year\_2\_Pct,  
 Student\_Attendance\_Year\_2\_Pct)   
 ~Primary\_Category , data = box\_pre)  
summary(mano\_pre\_PC, test="Wilks")

## Df Wilks approx F num Df den Df Pr(>F)   
## Primary\_Category 2 0.49464 207.24 8 3930 < 2.2e-16 \*\*\*  
## Residuals 1968   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

# MANOVA with Wilks-Lambda test for post covid data  
mano\_post\_PC <- manova( cbind(Suspensions\_Per\_100\_Students\_Year\_2\_Pct,  
 Misconducts\_To\_Suspensions\_Year\_2\_Pct,  
 Teacher\_Attendance\_Year\_2\_Pct,  
 Student\_Attendance\_Year\_2\_Pct)   
 ~Primary\_Category , data = box\_post)  
summary(mano\_post\_PC, test="Wilks")

## Df Wilks approx F num Df den Df Pr(>F)   
## Primary\_Category 2 0.5848 30.459 8 792 < 2.2e-16 \*\*\*  
## Residuals 399   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

#pre ANOVAs  
summary.aov(mano\_pre\_PC)

## Response Suspensions\_Per\_100\_Students\_Year\_2\_Pct :  
## Df Sum Sq Mean Sq F value Pr(>F)   
## Primary\_Category 2 93365 46682 282.76 < 2.2e-16 \*\*\*  
## Residuals 1968 324906 165   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Response Misconducts\_To\_Suspensions\_Year\_2\_Pct :  
## Df Sum Sq Mean Sq F value Pr(>F)   
## Primary\_Category 2 17546 8773.0 20.219 2.033e-09 \*\*\*  
## Residuals 1968 853930 433.9   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Response Teacher\_Attendance\_Year\_2\_Pct :  
## Df Sum Sq Mean Sq F value Pr(>F)  
## Primary\_Category 2 10.3 5.1285 0.8069 0.4464  
## Residuals 1968 12508.1 6.3558   
##   
## Response Student\_Attendance\_Year\_2\_Pct :  
## Df Sum Sq Mean Sq F value Pr(>F)   
## Primary\_Category 2 15691 7845.6 980.6 < 2.2e-16 \*\*\*  
## Residuals 1968 15746 8.0   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

#post ANOVAs  
summary.aov(mano\_post\_PC)

## Response Suspensions\_Per\_100\_Students\_Year\_2\_Pct :  
## Df Sum Sq Mean Sq F value Pr(>F)   
## Primary\_Category 2 7769 3884.4 43.747 < 2.2e-16 \*\*\*  
## Residuals 399 35428 88.8   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Response Misconducts\_To\_Suspensions\_Year\_2\_Pct :  
## Df Sum Sq Mean Sq F value Pr(>F)  
## Primary\_Category 2 532 266.19 0.5621 0.5705  
## Residuals 399 188951 473.56   
##   
## Response Teacher\_Attendance\_Year\_2\_Pct :  
## Df Sum Sq Mean Sq F value Pr(>F)   
## Primary\_Category 2 110.43 55.216 17.142 7.213e-08 \*\*\*  
## Residuals 399 1285.23 3.221   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Response Student\_Attendance\_Year\_2\_Pct :  
## Df Sum Sq Mean Sq F value Pr(>F)   
## Primary\_Category 2 6768.1 3384.0 133.43 < 2.2e-16 \*\*\*  
## Residuals 399 10119.7 25.4   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

#pre box plot  
box\_ta\_pre <- ggplot(box\_pre, aes(x = Primary\_Category, y = Teacher\_Attendance\_Year\_2\_Pct)) +  
 geom\_boxplot()   
box\_sa\_pre <- ggplot(box\_pre, aes(x = Primary\_Category, y = Student\_Attendance\_Year\_2\_Pct)) +  
 geom\_boxplot()   
box\_sus\_pre <- ggplot(box\_pre, aes(x = Primary\_Category, y = Suspensions\_Per\_100\_Students\_Year\_2\_Pct)) +  
 geom\_boxplot()   
box\_mis\_pre <- ggplot(box\_pre, aes(x = Primary\_Category, y = Misconducts\_To\_Suspensions\_Year\_2\_Pct)) +  
 geom\_boxplot()  
  
#post box plot  
box\_ta\_post <- ggplot(box\_post, aes(x = Primary\_Category, y = Teacher\_Attendance\_Year\_2\_Pct)) +  
 geom\_boxplot()   
box\_sa\_post <- ggplot(box\_post, aes(x = Primary\_Category, y = Student\_Attendance\_Year\_2\_Pct)) +  
 geom\_boxplot()   
box\_sus\_post <- ggplot(box\_post, aes(x = Primary\_Category, y = Suspensions\_Per\_100\_Students\_Year\_2\_Pct)) +  
 geom\_boxplot()   
box\_mis\_post <- ggplot(box\_post, aes(x = Primary\_Category, y = Misconducts\_To\_Suspensions\_Year\_2\_Pct)) +  
 geom\_boxplot()

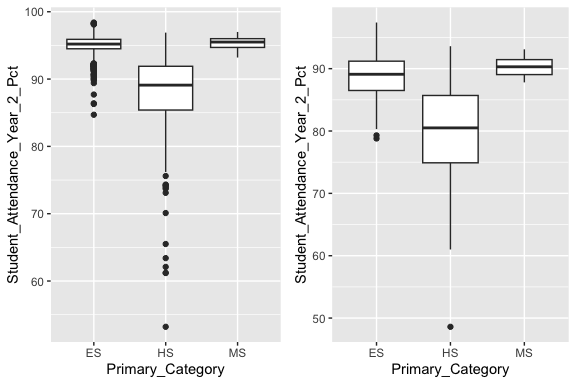


Figure 10: Box Plots of Student Attendance with pre covid on the left and post covid on the right

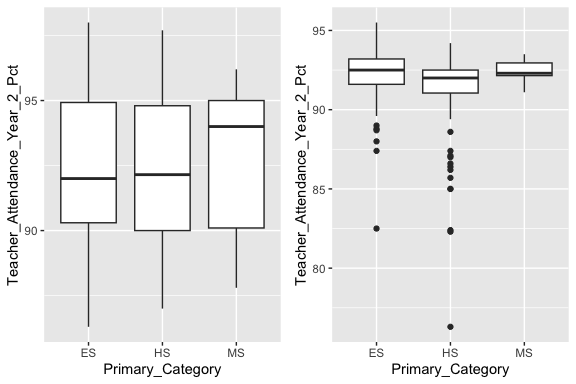


Figure 11: Box Plots of Teacher Attendance with pre covid on the left and post covid on the right

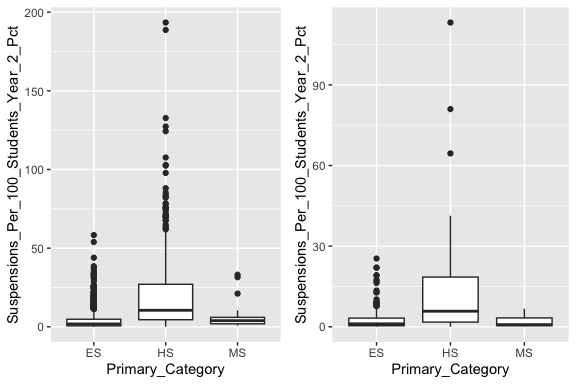


Figure 12: Box Plots of Suspensions with pre covid on the left and post covid on the right

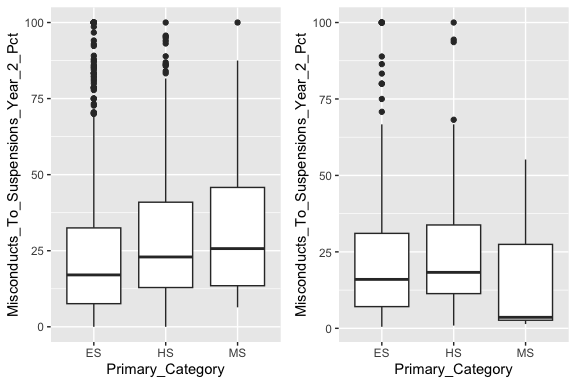


Figure 13: Box Plots of misconducts to suspensions with pre covid on the left and post covid on the right